ABSTRACT

A homopolar machine produces an axial counterforce on the rotating shaft to compensate for the load on the shaft's thrust bearing to reduce wear and noise and prolong bearing life. The counterforce is produced through magnetic interaction between the shaft and the machine's field coils and is created by changing the current excitation of the field coils, which results in a magnetic flux asymmetry in an inner flux return coupled to the shaft. The homopolar machine may also have a configuration that uses current collectors that maintain substantially constant contact pressure in the presence of high magnetic fields to improve current collector performance. The current collectors are flexible and may be made from either electrically conductive fibers or stacked strips such that they bear up against the armature so that the pressure is maintained by the spring constant of the current collector material.